Grammar or grammars? A maximum entropy analysis of loanword adaptation in Shanghainese

Meng Zhang
Utrecht University

This study investigates to what extent a computational model could capture segmental patterns of loanword adaptation in Shanghainese, a Wu-dialect of Mandarin Chinese (Chen & Gussenhoven, 2015), under the framework of Optimality Theory (OT; Prince & Smolensky, 1993). It is anticipated that one overarching grammar would be sufficient to account for the whole adaptation process.

While there are substantial OT studies in the realm of Sinitic loanword phonology, a trade-off persists between the scale of the data used and the ability of generalization from the findings. Moreover, Shanghainese sound inventories and loanword lexicon exhibit unique yet understudied lexical items and phonemic features such as the prevalence of voiced phonemes that could bring new insights to the matter.

Using a self-compiled corpus of 197 loanwords, four computational models were built and compared under Maximum Entropy analysis (MaxEnt; Goldwater & Johnson, 2003), a probabilistic extension of OT. The four models differed in whether consonants only or all segments are considered, and whether the learning process was carried out (lexical) item by item or for the entire corpus

The findings, however, challenge the assumption. While per-item models have achieved almost perfect performance at the ceiling, global models, in sharp contrast, displayed moderate to poor learnability, capturing only general or almost no pattern at all. Following this, diagnostics on both the constraints and dataset were conducted to seek out possible explanations.

Together, the results suggest that Shanghainese loanword adaptation is perhaps better characterized by a compilation of sub-grammars, rather than a single, unified ranking of constraints. Apart from implications of segmental asymmetry and structured variation, this study also discusses the empirical limitation of MaxEnt and OT-style analysis, as well as influential factors of loanword adaptation beyond sound changes.

References

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